Notice No. 1 Corrigenda

Rules and Regulations for the Classification of Offshore Units, July 2014

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Issue date: February 2015

Amendments to	Effective date
Part 3, Chapter 10, Sections 1, 4 & 6	CORRIGENDA
Part 3, Chapter 12, Section 1	CORRIGENDUM
Part 4, Chapter 3, Sections 3 & 4	CORRIGENDA
Part 4, Chapter 5, Section 4	CORRIGENDUM
Part 4, Chapter 6, Section 1, 4, 7 & 9	CORRIGENDA
Part 7, Chapter 3, Section 2	CORRIGENDA
Part 10, Chapter 1, Sections 9 & 12	CORRIGENDA
Part 10, Chapter 2, Sections 2 & 3	CORRIGENDA
Part 10, Appendix A, Section A1	CORRIGENDA
Part 11, Chapter 4, Section 4.25	CORRIGENDUM
Part 11, Chapter 5, Section 5.14	CORRIGENDA
Part 11, Chapter 13, Section 13.6	CORRIGENDUM
Part 11, Chapter 19, Section 19.1	CORRIGENDA

Lloyd's Register

Part 3, Chapter 10

Positional Mooring Systems

CORRIGENDA

■ *Section 1* **General**

1.1 Application

1.1.4 The requirements of this Chapter are not applicable to the mooring tethers on tension-leg units. For the design requirements of tension-leg units, *see* Pt 4, Ch ~~5~~ 4.

■ *Section 4* **Design aspects**

4.3 Design environmental conditions

4.3.1 Unless agreed otherwise with LR, the following design environmental combinations are to be considered:

(a) For floating offshore installations at a fixed location: 100-year sea state + 100-year wind + 10-year current.
For mobile offshore units: 50-year sea state + 50-year wind + 10-year current.

(b) For floating offshore installations at a fixed location: 100-year sea state + 10-year wind + 100-year ~~(or 50-year for mobile offshore units)~~ current.
For mobile offshore units: 50-year sea state + 10-year wind + 50-year current.

Joint probabilities of the various environmental actions may be taken into account if such information is available and can be adequately documented.

■ *Section 6* **Anchor lines**

6.3 Fatigue life

6.3.3 Fatigue life calculations for anchor lines can be carried out in accordance with a recognised Code, e.g., *API RP 2SK: Recommended Practice for Design and Analysis of Station keeping Systems for Floating Structures.*

Part 3, Chapter 12

Riser Systems

CORRIGENDUM

■ *Section 1* **General**

1.6 Buoyancy elements

1.6.1 Where subsea buoyant vessels are provided as an inherent part of the riser system design, the requirements of ~~Pt 3, Ch 2,2.3 of the *Rules and Regulations for the Classification of a Floating Offshore Installation at a Fixed Location*~~ Pt 3, Ch 13,2.3 are to be complied with.

Part 4, Chapter 3

Structural Design

CORRIGENDA

■ *Section 3*
Structural idealisation

3.2 Geometric properties of section

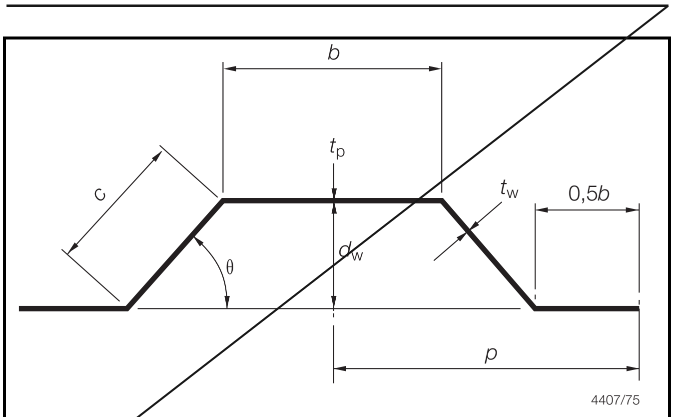
3.2.1 The symbols used in this sub-Section are defined as follows:

b = actual width, in metres, of the load-bearing plating, i.e., one-half of the sum of spacings between parallel adjacent members or equivalent supports

f = $0{,}3 \left(\frac{l}{b}\right)^{2/3}$ but is not to exceed 1,0. Values of this factor are given in Table 3.3.1

l = overall length, in metres, of the primary support member, *see* Fig. 3.3.3

t_p = thickness, in mm, of the attached plating. Where this varies, the mean thickness over the appropriate span is to be used.



~~**Fig 3.3.2 Double plate bulkhead geometry**~~

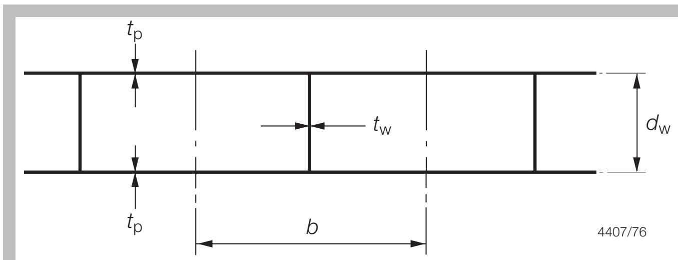


Fig 3.3.2 Double plate bulkhead geometry

■ *Section 4*
Structural design loads

4.16 Accidental loads

4.16.2 Collision loads imposed by attending vessels which may be approaching, mooring or lying alongside the unit are to be considered in the design. The unit is to be designed to withstand accidental impacts between attending vessels and the unit and be capable of absorbing the impact energy.
Recommended practice is given in LR's *Guidance Notes for Collision Analysis* to assist in identifying potential collision scenarios, establishing representative collision loads and assessing the impact of these loads on structural integrity.

Part 4, Chapter 5

Primary Hull Strength

CORRIGENDUM

■ *Section 4*
Buckling strength of primary members

4.4 Scantling criteria

Table 5.4.1 Overall member critical buckling stress

Condition	Member critical buckling stress σ_{CRB}, N/mm^2 (kgf/mm^2)
(a) When $\lambda < \sqrt{\eta}$	$\sigma_o = \frac{\sigma_o{}^2 \lambda^2}{4\pi^2 E}$
(b) When $\lambda \geq \sqrt{\eta}$	$\frac{\pi^2 E}{\lambda^2}$
Symbols and parameters	
σ_o, E as defined in 3.2.1 l = unsupported length of member, in metres K = effective length factor to be generally taken as unity but will be specially considered in association with end conditions l_e = Kl = unsupported length of member, in metres r = least radius of gyration of member cross-section, in mm, and may be taken as: $r = 10\sqrt{\frac{I}{A}}$ mm A = cross-sectional area of member, in cm^2 I = least moment of inertia of member cross-section, in cm^4 λ = slenderness ratio and may be taken as: $\lambda = \frac{1000 l_e}{r}$ η = $\frac{2\pi^2 E}{\sigma_o}$	

Part 4, Chapter 6

Local Strength

CORRIGENDA

■ *Section 1*
General requirements

1.1 General

1.1.4 The local strength of ship units is to comply with Part 10. The ~~lcoal~~ local strength of other surface type units is to comply with Ch 4,4.

■ *Section 4* **Decks**

4.4 Deck supporting structure

Table 6.4.4 Pillars

(*Part only shown*)

Symbols	
b	= breadth of side of a hollow rectangular pillar or breadth of flange or web of a built or rolled section, in mm
d_p	= mean diameter of tubular pillars, in mm
k	= local scantling higher tensile steel factor, *see* Ch 2,1.2.1, but not less than 0,72
l	= overall length of pillar, in metres
l_e	= effective length of pillar, in metres, and is taken as $0{,}80l$
r	= least radius of gyration of pillar cross-section, in mm, and may be taken as:
r	$= 10\sqrt{\dfrac{I}{A_p}}$ mm
A_p	= cross-sectional area of pillar, in cm^2
H_g as defined in Table ~~7.4.3~~ 6.4.3	
I	= least moment of inertia of cross-section, in cm^4
P	= load, in kN (tonne-f), supported by the pillar and is to be taken as: $P = P_o + P_a$ but not less than 19,62 kN (2 tonne-f)
P_a	= load, in kN (tonne-f), from pillar or pillars above (zero if no pillars over)
P_o	= load, in kN (tonne-f), supported by pillar based on H_g

■ *Section 7* **Bulkheads**

7.3 Watertight and deep tank bulkheads

7.3.1 The scantlings of watertight and ~~deeptank~~ deep tank bulkheads are to comply with the requirements of Tables 6.7.1 to 6.7.3. Where tanks cannot be inspected at normal periodic surveys, the scantlings derived from this Section are to be suitably increased.

Table 6.7.1 Watertight and deep tank bulkhead scantlings

(*Part only shown*)

Item and requirement	Watertight bulkheads	Deep tank bulkheads
(3) Inertia of rolled and built stiffeners and swedges	–	$I = \dfrac{2{,}3}{k} l_e Z$ $cm^{\cancel{3}4}$
(5) Stringers or webs supporting vertical or horizontal stiffening (a) Modulus (b) Inertia	$Z = 5{,}5k\, h_4\, S\, l_e^2$ cm^3 –	$Z = 11{,}7\rho\, k\, h_4\, S\, l_e^2$ cm^3 $I = \dfrac{2{,}3}{k} l_e Z$ $cm^{\cancel{3}4}$

■ *Section 9*
Superstructures and deckhouses

9.2 Symbols

(*Part only shown*)

9.2.1 The following symbols and definitions are applicable to this Chapter, unless otherwise stated:

L_2 = ~~length of unit in metres,~~ Rule length, *L*, but need not be taken greater than 250 m

L_3 = ~~length of unit in metres,~~ Rule length, *L*, but need not be taken greater than 300 m

9.10 Deck girders and transverses

9.10.1 The scantlings of deck girders and transverses on erection decks are to be in accordance with the requirements of Table 6.4.3, using the appropriate load head, H_g, determined from ~~Table 6.2.1~~ 9.9.2 or 9.9.3.

Part 7, Chapter 3

Fire Safety

CORRIGENDA

■ *Section 2*
Definitions

2.4 Fire and Explosion Evaluation (FEE)

2.4.2 These Rules allow for the dimensioning of explosion loads to be based on probabilistic risk assessment techniques. A methodology to establish risk-based explosion loads based on such a probabilistic approach is given in LR's ~~*Guidelines*~~ *Guidance Notes for the Calculation of Probabilistic Explosion Loads*.

2.4.3 Important parts of the FEE are the types of fires likely to occur on the offshore unit, the dimensioning of fire loads, fire protection principles, fire mitigation measures and fire response. To assist in developing the FEE, information covering these aspects are provided in LR's *Guidance Notes for Fire Loadings and Protection*.

Part 10, Chapter 1

General Requirements

CORRIGENDA

■ *Section 9*
Mooring Structure

9.1 General

9.1.3 The minimum hull modulus in way of turret areas and other large openings is to satisfy the Rule requirements for longitudinal strength. When the turret is situated within ~~0,5L~~ 0,5*L* amidships, the minimum hull midship section modulus about the transverse neutral axis at deck or keel is to be maintained in way of the turret opening. Increases in plate thicknesses are to take place gradually. Any reduction in hull section modulus should be kept to a minimum and compensation fitted where necessary.

■ *Section 12*
Corrosion additions

12.3 Corrosion additions

Table 1.12.1 Corrosion rate for one side of structural member

(*Part only shown*)

Compartment type	Structural member	Corrosion rate t_{c1}, t_{c2} (mm/year)
Fuel and lubricating oil tank~~, see Note 3~~		0,05

Part 10, Chapter 2

Loads and Load Combinations

CORRIGENDA

■ *Section 2*
Static load components

2.3 Local static loads

Table 2.2.2 Testing load height

(*Part only shown*)

Compartment or structure to be tested	Testing load height, in metres
Cargo tanks and other tanks designed for liquid filling, including double bottom tanks, hopper side tanks, topside tanks, double side tanks, deep tanks, fuel oil bunkers, slop tanks, fresh water tanks, lube oil tanks, fore and after peaks used as tanks and/or fitted with air pipe. Cofferdams	The greater of the following: $z_{test} = z_{top} + h_{air}$ $z_{test} = z_{top} + 2{,}4$ $z_{test} = \cancel{z_{top} + z_{pv}}$ $z_{top} + z_{valve}$
Symbols are as defined in Table 2.2.1	
$\cancel{z_{pv}}$ z_{valve} = equivalent head of pressure safety valve, in metres = $\cancel{10P_{pv}}$ $10P_{valve}$ $\cancel{P_{pv}}$ P_{valve} = setting pressure, in bar, of pressure safety valve where applicable	

■ *Section 3*
Dynamic load components

3.1 Symbols

(*Part only shown*)

3.1.1 For the purposes of this Section, the following symbols apply:

$f_{Env\text{-}pitch}$ = environmental factor due to pitch motion, as defined in 3.3.2~~ and 3.5.3~~

Part 10, Appendix A

Dynamic Load Combination Factors

CORRIGENDA

■ *Section A1* **General**

2.1 Symbols

Table A1.6 Dynamic load cases for central tank region for light draught condition, unrestricted worldwide transit

(*Part only shown*)

Wave direction	Head sea		Beam sea					
Max. response	M_{wv}	a_v	a_t		P_{ctr}		P_{WL}	
Dynamic load case	1	2	3S	3P	4S	4P	5S	5P
$f_{\text{WL-}\cancel{\text{pt}}}$	0,3	–0,2	–0,4	0,7	0,2	~~0,7~~ 0,9	0,2	1,0

Table A1.10 Dynamic load cases for forward end region for deep draught condition for a weather vaning aframax unit, west of Shetland Is.

(*Part only shown*)

Max. response	a_v	a_{lng}	P_{ctr}		P_{bilge}		P_{WL}		a_t	
Dynamic load case	1	2	3S	3P	4S	4P	5S	5P	6S	6P
$f_{\text{ctr-stb}}$	–0,9	0,8	1,0	1,0	1,0	1,0	0,9	0,9	~~–0,1~~ 0,0	~~0,1~~ 0,0
$f_{\text{bilge-stb}}$	–1,0	0,8	0,9	0,8	~~0,8~~ 1,0	1,0	0,8	0,8	–0,5	0,4
$f_{\text{ctr-pt}}$	–0,9	0,8	1,0	1,0	1,0	1,0	0,9	0,9	~~0,1~~ 0,0	~~–0,1~~ 0,0
$f_{\text{bilge-pt}}$	–1,0	0,8	0,8	0,9	1,0	~~0,8~~ 1,0	0,8	0,8	0,4	–0,5

Table A1.11 Dynamic load cases for aft region for light draught condition for a weather vaning aframax unit, west of Shetland Is.

(*Part only shown*)

Max. response	P_{ctr}	P_{WL}		a_v		a_t	
Dynamic load case	1	2S	2P	3S	3P	4S	4P
$f_{\text{ctr-stb}}$	1,0	0,5	0,5	–0,4	–0,4	–0,8	~~–0,4~~ –0,8
$f_{\text{ctr-pt}}$	1,0	0,5	0,5	–0,4	–0,4	~~–0,4~~ –0,8	–0,8

Table A1.14 Dynamic load cases for aft region for deep draught condition for a weather vaning aframax unit, North Sea

(*Part only shown*)

Max. response	P_{ctr}	P_{WL}		a_v		a_t	
Dynamic load case	1	2S	2P	3S	3P	4S	4P
$f_{\text{ctr-stb}}$	1,0	0,7	0,7	–1,0	–1,0	–0,3	~~–0,1~~ –0,3
$f_{\text{ctr-pt}}$	1,0	0,7	0,7	–1,0	–1,0	~~–0,1~~ –0,3	–0,3

Table A1.15 Dynamic load cases for central tank region for deep draught condition for a weather vaning aframax unit, North Sea

(*Part only shown*)

Max. response	M_{wv}	a_v	a_{lng}	$M_{wv\text{-}h}$		a_t		P_{ctr}		P_{WL}	
Dynamic load case	1 (Hog)	2	3	4S	4P	5S	5P	6S	6P	7S	7P
$f_{ctr\text{-}stb}$	1,0	–0,9	–0,2	–0,2	~~–0,1~~ –0,2	–0,4	~~–0,1~~ –0,4	1,0	1,0	0,4	0,4
$f_{ctr\text{-}pt}$	1,0	–0,9	–0,2	~~–0,1~~ –0,2	–0,2	~~–0,1~~ –0,4	–0,4	1,0	1,0	0,4	0,4

Table A1.18 Dynamic load cases for central tank region for light draught condition for a weather vaning aframax unit, North Sea

(*Part only shown*)

Max. response	M_{wv}	a_v	a_{lng}	$M_{wv\text{-}h}$		a_t		P_{ctr}		P_{WL}	
Dynamic load case	1 (Hog)	2	3	4S	4P	5S	5P	6S	6P	7S	7P
$f_{ctr\text{-}stb}$	1,0	–0,1	–0,5	–0,7	~~–0,5~~ –0,7	~~–0,4~~ 0,0	~~0,2~~ 0,0	1,0	1,0	0,9	0,9
$f_{ctr\text{-}pt}$	1,0	–0,1	–0,5	~~–0,5~~ –0,7	–0,7	~~0,2~~ 0,0	~~–0,4~~ 0,0	1,0	1,0	0,9	0,9

Table A1.19 Dynamic load cases for forward end region for light draught condition for a weather vaning aframax unit, North Sea

(*Part only shown*)

Max. response	a_v	a_{lng}	P_{ctr}		P_{bilge}		P_{WL}		a_t	
Dynamic load case	1	2	3S	3P	4S	4P	5S	5P	6S	6P
$f_{ctr\text{-}stb}$	–0,9	0,8	1,0	1,0	1,0	1,0	0,8	0,8	~~–0,3~~ 0,0	~~0,1~~ 0,0
$f_{bilge\text{-}stb}$	–0,9	0,8	0,9	0,5	~~0,6~~ 1,0	1,0	0,8	0,4	–0,8	0,7
$f_{ctr\text{-}pt}$	–0,9	0,8	1,0	1,0	1,0	1,0	0,8	0,8	~~0,1~~ 0,0	~~–0,3~~ 0,0
$f_{bilge\text{-}pt}$	–0,9	0,8	0,5	0,9	1,0	~~0,6~~ 1,0	0,4	0,8	0,7	–0,8

Table A1.22 Dynamic load cases for forward end region for deep draught condition for a weather vaning aframax unit, Brazil Campos Basin

(*Part only shown*)

Max. response	a_v	a_{lng}	P_{ctr}		P_{bilge}		P_{WL}		a_t	
Dynamic load case	1	2	3S	3P	4S	4P	5S	5P	6S	6P
$f_{ctr\text{-}stb}$	–1,0	1,0	1,0	1,0	1,0	1,0	1,0	~~0,9~~ 1,0	~~–0,2~~ 0,0	~~0,1~~ 0,0
$f_{bilge\text{-}stb}$	–0,9	0,9	0,9	0,9	~~0,9~~ 1,0	1,0	0,8	0,9	–0,7	0,7
$f_{ctr\text{-}pt}$	–0,1	1,0	1,0	1,0	1,0	1,0	~~0,9~~ 1,0	1,0	~~0,1~~ 0,0	~~–0,2~~ 0,0
$f_{bilge\text{-}pt}$	–0,9	0,9	0,9	0,9	1,0	~~0,9~~ 1,0	0,9	0,8	0,7	–0,7

Table A1.23 Dynamic load cases for aft region for light draught condition for a weather vaning aframax unit, Brazil Campos Basin

(*Part only shown*)

Max. response	P_{ctr}	P_{WL}		a_v		a_t	
Dynamic load case	1	2S	2P	3S	3P	4S	4P
$f_{ctr\text{-}stb}$	–1,0	1,0	1,0	~~–0,6~~ –0,7	–0,7	~~–0,7~~ 0,0	~~0,4~~ 0,0
$f_{ctr\text{-}pt}$	–1,0	1,0	1,0	–0,7	~~–0,6~~ –0,7	~~0,4~~ 0,0	~~–0,7~~ 0,0

Table A1.26 Dynamic load cases for aft region for deep draught condition for a weather vaning aframax unit, Western Australia (non-cyclonic)

(*Part only shown*)

Max. response	P_{ctr}	P_{WL}		a_v		a_t	
Dynamic load case	1	2S	2P	3S	3P	4S	4P
$f_{ctr\text{-}stb}$	~~–0,1~~ 1,0	0,6	0,6	–0,9	–0,9	–0,4	~~–0,2~~ –0,4
$f_{ctr\text{-}pt}$	~~–0,1~~ 1,0	0,6	0,6	–0,9	–0,9	~~–0,2~~ –0,4	–0,4

~~Table A1.27 Dynamic load cases for central tank region for deep draught condition for a weather vaning aframax unit,~~ Western Australia (non-cyclonic)

Max. response	M_{wv}	a_v	a_{lng}	$M_{wv\text{-}h}$		a_t		P_{ctr}		P_{WL}	
Dynamic load case	1 (Hog)	2	3	4S	4P	5S	5P	6S	6P	7S	7P
Global loads	1,0	0,8	–0,5	–0,4	–0,4	0,2	0,2	–0,5	–0,5	–0,3	–0,3
	–0,1	–0,1	–0,5	–0,1	1,0	–0,1	0,1	–0,1	0,1	–0,2	0,2
Accelerations	0,4	1,0	–0,3	–0,2	–0,2	0,3	0,3	–1,0	–1,0	–0,1	–0,1
	0,4	1,0	–0,3	–0,2	–0,2	0,1	0,4	–1,0	–1,0	–0,1	–0,1
	0,4	1,0	–0,3	–0,2	–0,2	0,4	0,1	–1,0	–1,0	–0,1	–0,1
	0,1	0,1	0,0	0,1	–0,1	1,0	–1,0	0,3	–0,3	0,0	0,0
	–0,3	0,3	1,0	0,6	0,6	–0,1	–0,1	0,1	0,1	0,5	0,5
	–0,3	0,4	1,0	0,6	0,6	–0,1	–0,1	0,1	0,1	0,5	0,5
	–0,3	–0,2	1,0	0,6	0,6	–0,1	–0,1	0,1	0,1	0,5	0,5
	–0,3	0,3	1,0	0,6	0,6	–0,1	–0,1	0,1	0,1	0,5	0,5
Dynamic wave pressure for starboard side	0,4	–0,8	–0,2	–0,2	–0,2	–0,3	–0,1	1,0	1,0	0,2	0,2
	0,2	–0,6	–0,2	–0,3	0,2	–0,8	0,8	0,8	0,7	0,5	0,2
	0,4	–0,3	–0,2	–0,3	0,1	–0,7	0,7	0,7	0,3	1,0	1,0
Dynamic wave pressure for port side	0,4	–0,8	–0,2	–0,2	–0,2	–0,1	–0,3	1,0	1,0	0,2	0,2
	0,2	–0,6	–0,2	0,2	–0,3	0,8	–0,8	0,7	0,8	0,2	0,5
	0,4	–0,3	–0,2	0,1	–0,3	0,7	–0,7	0,3	0,7	1,0	1,0

Table A1.27 Dynamic load cases for central tank region for deep draught condition for a weather vaning aframax unit, Western Australia (non-cyclonic)

Max. response	M_{wv}	a_v	a_{lng}	M_{wv-h}		a_t		P_{ctr}		P_{WL}	
Dynamic load case	1 (Hog)	2	3	4S	4P	5S	5P	6S	6P	7S	7P
f_{mv}	1,0	0,8	–0,5	–0,4	–0,4	0,2	0,2	–0,5	–0,5	–0,3	–0,3
f_{mh}	–0,1	–0,1	–0,5	–1,0	1,0	–0,1	0,1	–0,1	0,1	–0,2	0,2
f_{v-mid}	0,4	1,0	–0,3	–0,2	–0,2	0,3	0,3	–1,0	–1,0	–0,1	–0,1
f_{v-pt}	0,4	1,0	–0,3	–0,2	–0,2	0,1	0,4	–1,0	–1,0	–0,1	–0,1
f_{v-stb}	0,4	1,0	–0,3	–0,2	–0,2	0,4	0,1	–1,0	–1,0	–0,1	–0,1
f_t	0,1	0,1	0,0	0,1	–0,1	1,0	–1,0	0,3	–0,3	0,0	0,0
$f_{lng-mid}$	–0,3	0,3	1,0	0,6	0,6	–0,1	–0,1	0,1	0,1	0,5	0,5
f_{lng-pt}	–0,3	0,4	1,0	0,6	0,6	–0,1	–0,1	0,1	0,1	0,5	0,5
$f_{lng-stb}$	–0,3	0,2	1,0	0,6	0,6	–0,1	–0,1	0,1	0,1	0,5	0,5
$f_{lng-ctr}$	–0,3	0,3	1,0	0,6	0,6	–0,1	–0,1	0,1	0,1	0,5	0,5
$f_{ctr-stb}$	0,4	–0,8	–0,2	–0,2	–0,2	–0,3	–0,3	1,0	1,0	0,2	0,2
$f_{bilge-stb}$	0,2	–0,6	–0,2	–0,3	0,2	–0,8	0,8	0,8	0,7	0,5	0,2
f_{WL-stb}	0,4	–0,3	–0,2	–0,3	0,1	–0,7	0,7	0,7	0,3	1,0	1,0
f_{ctr-pt}	0,4	–0,8	–0,2	–0,2	–0,2	–0,3	–0,3	1,0	1,0	0,2	0,2
$f_{bilge-pt}$	0,2	–0,6	–0,2	0,2	–0,3	0,8	–0,8	0,7	0,8	0,2	0,5
f_{WL-pt}	0,4	–0,3	–0,2	0,1	–0,3	0,7	–0,7	0,3	0,7	1,0	1,0

Table A1.30 Dynamic load cases for central tank region for light draught condition for a weather vaning aframax unit, Western Australia (non-cyclonic)

(*Part only shown*)

Max. response	M_{wv}	a_v	a_{lng}	M_{wv-h}		a_t		P_{ctr}		P_{WL}	
Dynamic load case	1 (Hog)	2	3	4S	4P	5S	5P	6S	6P	7S	7P
$f_{ctr-stb}$	0,9	–0,6	–0,4	–0,6	~~0,3~~ –0,6	–0,4	~~0,2~~ –0,4	1,0	1,0	0,3	0,3
f_{ctr-pt}	0,9	–0,6	–0,4	~~0,3~~ –0,6	–0,6	~~0,2~~ –0,4	–0,4	1,0	1,0	0,3	0,3

Table A1.31 Dynamic load cases for forward end region for light draught condition for a weather vaning aframax unit, Western Australia (non-cyclonic)

(*Part only shown*)

Max. response	a_v	a_{lng}	P_{ctr}		P_{bilge}		P_{WL}		a_t	
Dynamic load case	1	2	3S	3P	4S	4P	5S	5P	6S	6P
f_{v-pt}	1,0	–0,8	–0,8	–0,8	–0,1	–0,1	–0,5	–0,5	~~0,2~~ –0,1	0,2
f_{v-stb}	1,0	–0,8	–0,8	–0,8	–1,0	–1,0	–0,5	–0,5	~~–0,1~~ 0,2	–0,1
$f_{ctr-stb}$	–1,0	0,8	1,0	1,0	1,0	1,0	1,0	1,0	~~–0,2~~ 0,0	~~0,1~~ 0,0
f_{ctr-pt}	–1,0	0,8	1,0	1,0	1,0	1,0	1,0	1,0	~~0,1~~ 0,0	~~–0,2~~ 0,0

Table A1.35 Dynamic load cases for aft region for light draught condition for a weather vaning VLCC unit, Brazil Campos Basin

(*Part only shown*)

Max. response	P_{ctr}	P_{WL}		a_v		a_t	
Dynamic load case	1	2S	2P	3S	3P	4S	4P
$f_{v\text{-}pt}$	0,3	–0,1	–0,1	1,0	1,0	0,2	~~0,2~~ 0,5
$f_{v\text{-}stb}$	0,3	–0,1	–0,1	1,0	1,0	0,5	~~0,5~~ 0,2
$f_{ctr\text{-}stb}$	–1,0	0,2	0,2	–0,4	–0,4	–0,2	~~–0,1~~ –0,2
$f_{ctr\text{-}pt}$	–1,0	0,2	0,2	–0,4	–0,4	~~–0,1~~ –0.2	–0,2

Table A1.38 Dynamic load cases for aft region for deep draught condition for a weather vaning VLCC unit, Western Australia (non-cyclonic)

(*Part only shown*)

Max. response	P_{ctr}	P_{WL}		a_v		a_t	
Dynamic load case	1	2S	2P	3S	3P	4S	4P
$f_{v\text{-}pt}$	0,1	–0,1	–0,1	1,0	1,0	~~0,4~~ 0,1	~~0,1~~ 0,4
$f_{v\text{-}stb}$	0,1	–0,1	–0,1	1,0	1,0	~~0,1~~ 0,4	~~0,4~~ 0,1
$f_{ctr\text{-}stb}$	–0,1	0,3	0,3	–0,9	–0,9	~~0,2~~ 0,0	~~–0,4~~ 0,0
$f_{ctr\text{-}pt}$	–1,0	0,3	0,3	–0,9	–0,9	~~–0,4~~ 0,0	~~0,2~~ 0,0

Table A1.39 Dynamic load cases for central tank region for deep draught condition for a weather vaning VLCC unit, Western Australia (non-cyclonic)

(*Part only shown*)

Max. response	M_{wv}	a_v	a_{lng}	$M_{wv\text{-}h}$		a_t		P_{ctr}		P_{WL}	
Dynamic load case	1 (Hog)	2	3	4S	4P	5S	5P	6S	6P	7S	7P
$f_{v\text{-}pt}$	0,2	1,0	–0,6	–0,6	–0,6	~~0,6~~ 0,2	~~0,2~~ 0,6	–0,2	–0,2	–0,1	–0,1
$f_{v\text{-}stb}$	0,2	1,0	–0,6	–0,6	–0,6	~~0,2~~ 0,6	~~0,6~~ 0,2	–0,2	–0,2	–0,1	–0,1
$f_{ctr\text{-}stb}$	1,0	–0,9	0,1	0,4	~~0,3~~ 0,4	~~–0,2~~ –0.4	–0,4	–0,1	–0,1	0,1	0,1
$f_{ctr\text{-}pt}$	1,0	–0,9	0,1	~~0,3~~ 0,4	0,4	–0,4	~~–0,2~~ –0.4	–1,0	–1,0	0,1	0,1

Table A1.42 Dynamic load cases for central tank region for light draught condition for a weather vaning VLCC unit, Western Australia (non-cyclonic)

(*Part only shown*)

Max. response	M_{wv}	a_v	a_{lng}	$M_{wv\text{-}h}$		a_t		P_{ctr}		P_{WL}	
Dynamic load case	1 (Hog)	2	3	4S	4P	5S	5P	6S	6P	7S	7P
$f_{v\text{-}pt}$	0,3	1,0	0,2	–0,7	–0,7	0,1	~~0,1~~ 0,5	0,1	0,1	–0,2	–0,2
$f_{v\text{-}stb}$	0,3	1,0	0,2	–0,7	–0,7	0,5	~~0,5~~ 0,1	0,1	0,1	–0,2	–0,2
$f_{ctr\text{-}stb}$	0,8	–0,8	–0,1	0,3	~~0,2~~ 0,3	~~–0,1~~ –0,2	–0,2	–1,0	–1,0	1,0	1,0
$f_{ctr\text{-}pt}$	0,8	–0,8	–0,1	~~0,2~~ 0,3	0,3	–0,2	~~–0,1~~ –0,2	–1,0	–1,0	1,0	1,0

Table A1.43 Dynamic load cases for forward end region for light draught condition for a weather vaning VLCC unit, Western Australia (non-cyclonic)

(*Part only shown*)

Max. response	a_v	a_{lng}	P_{ctr}		P_{bilge}		P_{WL}		a_t	
Dynamic load case	1	2	3S	3P	4S	4P	5S	5P	6S	6P
$f_{ctr\text{-}stb}$	–0,7	0,7	–1,0	–1,0	–1,0	–1,0	0,9	0,9	~~–0,4~~ –0,5	–0,5
$f_{ctr\text{-}pt}$	–0,7	0,7	–1,0	–1,0	–1,0	–1,0	0,9	0,9	–0,5	~~–0,4~~ –0,5

Table A1.51 Dynamic load cases for strength assessment by FEM for a weather vaning aframax unit, west of Shetland Is.

(*Part only shown*)

Max. response	M_{wv} (Sagging)	M_{wv} (Hogging)	Q_{wv} (Positive)	Q_{wv} (Negative)	a_v		$M_{wv\text{-}h}$	
Dynamic load case	1	2	3	4	5S	5P	6S	6P
$f_{ctr\text{-}pt}$	–1,0	1,0	–1,0	1,0	~~–0,9~~ –1,0	–1,0	0,2	0,2
$f_{ctr\text{-}stb}$	–1,0	1,0	–1,0	1,0	–1,0	~~–0,9~~ –1,0	0,2	0,2

Table A1.55 Dynamic load cases for strength assessment by FEM for a weather vaning VLCC unit, Brazil Campos Basin

(*Part only shown*)

Max. response	M_{wv} (Sagging)	M_{wv} (Hogging)	Q_{wv} (Positive)	Q_{wv} (Negative)	a_v		$M_{wv\text{-}h}$	
Dynamic load case	1	2	3	4	5S	5P	6S	6P
$f_{ctr\text{-}pt}$	–1,0	1,0	–0,2	0,2	~~0,7~~ 1,0	1,0	0,2	0,2
$f_{ctr\text{-}stb}$	–1,0	1,0	–0,2	0,2	1,0	~~0,7~~ 1,0	0,2	0,2

Part 11, Chapter 4

Cargo Containment

CORRIGENDUM

Part E Tank types

4.25 Integral tanks

LR 4.25.1 Integral tanks are to be designed and ~~sconstructed~~ constructed in accordance with the requirements for cargo tanks in Part 10, using the actual cargo density and additional vapour pressure.

Part 11, Chapter 5

Process Pressure Vessels and Liquids, Vapour and Pressure Piping Systems and Offshore Arrangements

CORRIGENDA

LR 5.14 Cryogenic liquefied gas spill control

LR 5.14.4 Documents and plans

~~**LR 5.14.7.8**~~ **LR 5.14.4.8** Each component of the cryogenic process equipment such as, and not limited to tanks, pumps, compressors, pipelines, valves and vessels must be considered as a potential source of cryogenic release. Special consideration shall be made for components which are not generally considered to be a ~~sources~~ source of cryogen release such as all welded pipelines, pressure vessels and associated welded instrumentation.

Part 11, Chapter 13

Instrumentation and Automation Systems

CORRIGENDUM

13.6 Gas detection

13.6.2 A permanently installed system of gas detection and audible and visual alarms shall be fitted in:

.1 all enclosed cargo and cargo machinery spaces (including turrets compartments) or similar enclosures containing gas piping, gas equipment or gas consumers;
.2 other enclosed or semi-enclosed spaces where cargo vapours may accumulate including interbarrier spaces and hold spaces for independent tanks other than Type C;
.3 airlocks;
.4 the spaces in gas fired internal combustion engines, referred to in 16.7.3.3;
.5 ventilation hoods and gas ducts required by Chapter 16;
.6 cooling/heating circuits, as required by 7.8.4;
.7 inert gas generator supply headers;
.8 motor rooms for cargo handling machinery.

~~However, the overall provision of gas detection on the installation should be defined based on ignition risk mitigating measures and philosophy derived for the installation via the Fire and Explosion Evaluation (FEE).~~

The various fire and gas detectors should feed signals into a robust fire and gas detection system/panel, in accordance with the requirements of Pt 7, Ch 1,2. High level fire and gas signals, along with process hazard signals are then to feed into a robust Emergency Shut-down (ESD) System, in accordance with the requirements of Chapter 18 and Pt 7, Ch 1,7.

Part 11, Chapter 19

Summary of Minimum Requirements

CORRIGENDA

19.1 Explanatory notes to the summary of minimum requirements

a Product name	b UN number	c Ship unit type	d Independent tank type C required	e Control of vapour space within cargo tanks	f Vapour detection	g Gauging	h MFAG Table No.	i Special requirements
Butane	1011	2G	—	—	F	R	310	—
Butane-propane mixture	1011/1978	2G	—	—	F	R	310	—
Carbon dioxide (High Purity)	—	2G *see* Note 1	—	—	A	R	—	17.4
Carbon dioxide (Reclaimed Quality)	—	2G *see* Note 1	—	—	A	R	—	17.5
Ethane	1961	2G	—	—	F	R	310	—
Methane (LNG)	1972	2G	—	—	F	C	620	—
Nitrogen	2040	2G *see* Note 1	—	—	A	C	—	17.6
Pentane (all isomers) *see* Note 2	1265	2G	—	—	F	R	310	17.2, ~~17.3~~ 17.3.1
Propane	1978	2G	—	—	F	R	310	—

LR NOTES
1. Ship units designed to store LNG or LPG with additional tanks to store carbon dioxide are to comply with the requirements for ship unit type 2G.
2. This cargo is also covered by the *International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* (IBC Code).

Published by Lloyd’s Register Group Limited
Registered office (Reg. no. 08126909)
71 Fenchurch Street, London, EC3M 4BS
United Kingdom